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ABSTRACT

This discussion paper seeks to highlight the need for standardization in the development of computer and telecommunications systems in Australian libraries to ensure an inbuilt capacity to interconnect with other systems. It presents a proposal for the establishment of an on-going mechanism responsible for identifying and developing standards suitable for the systems. The following topics are considered: (1) problems confronting development of nationally compatible systems; (2) benefits of standards; (3) existing standards; (4) cost of ignoring standards; (5) deciding what standards are applicable in Australia; (6) priorities; and (7) mechanisms to address the problems. A selection of relevant existing standards from four sources is appended. (Author/KP)

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DEVELOPMENT OF RESOURCE SHARING NETWORK

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NETWORKS STUDY NO. 5

STANDARDS FOR AUSTRALIAN COMPUTER-BASED SERVICES : A DISCUSSION PAPER

Canberra
National Library of Australia
1977

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AUTHOR ABSTRACT
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Author: National Library of Australia.

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Abstract (up to 200 words):

The aim of the study is twofold. First, it seeks to highlight the need for standardisation to ensure the promotion of systems compatability. Second, it seeks to make the first move in preparing a concrete proposal for the establishment of an ongoing mechanism responsible for identifying or developing standards suitable for Australian conditions and for securing ratification of each standard by the appropriate Australian organisation. A list of relevant standards is included.

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PREFACE

The adaptation and use of new and increasingly sophisticated computer and telecommunications technology by Australian libraries has added new vistas to the potential for co-operative development and sharing of resources and services. At the same time the Australian library community is presented with a series of new challenges which have to be met if the full potential of the new technologies is to be exploited.

The immediate objective must be to ensure that individual systems are developed with an inbuilt capacity to interconnect with other systems. The degree to which this can be achieved will rely on the extent of introduction and observance of agreed standards. The trend towards automation in Australian libraries has highlighted the inadequacies of the range of existing standards and has emphasised the need for:

(i) the identification and ratification of suitable overseas or Australian standards; and

(ii) the investigation, development and subsequent ratification of standards appropriate to Australian conditions in areas where no suitable standards currently exist.

This document has been prepared by the National Library in order to discharge its responsibilities as national focal point for STISEC, UNISIST, NATIS and AIBIS. Its aim is twofold. First, it seeks to highlight the need for standardisation to ensure the promotion of systems compatibility. Second, it seeks to make the first move in preparing a concrete proposal for the establishment of an ongoing mechanism responsible for identifying or developing standards suitable for Australian conditions and for securing ratification of each standard by the appropriate Australian organisations.

It is not intended that this document be any more than an interim discussion paper. It is intended to serve as a stimulus to other organisations with a view to receiving from them input as to how discussion and solution of the problems of systems standardisation should proceed.

The National Library's immediate objective is to develop a proposal for the establishment of an Australian equivalent of the technical committees of the American National Standards Institute (ANSI Z 39) and the International Standards Organisation (ISO TC 46), which are responsible for the formulation of draft standards suitable for ratification by their respective parent bodies. Before further action is taken the National Library seeks to consult the Australian library community and accordingly invites interested organisations or persons to communicate to the Library their views and comments on the issues so that these can be taken into account in formulating the proposal.

G. Chandler
Director-General

INTRODUCTION

1. Libraries in Australia, in common with their counterparts overseas, find themselves subject to rapidly increasing operating costs. A large component of the operating cost consists of staff salaries. Traditional library practices are very labour-intensive. Consequently, in order to maintain at least a reasonable rate of cost escalation, there is an increasing trend towards the application of automated processing techniques to library operations. As part of this attempt to curtail cost increases, libraries are also embracing the concept of resource sharing networks. Resource sharing has been practised in Australia for some time but has been confined to the sharing of library materials through inter-library loan procedures. In the recent past, with the introduction of automatic data processing equipment to a number of libraries, resource sharing has been extended to the sharing of computer programs and bibliographic data in machine readable form. There are strong indications that this trend will continue and accelerate as more libraries avail themselves of the benefits of automation. Firm plans are being made in a number of areas to implement resource sharing between libraries using computers and telecommunications technology as the prime vehicle.
2. These trends have highlighted inadequacies in the area of the application of standards to library data processing systems. This document attempts to set out the areas of difficulty, to identify those areas which require priority attention and to discuss the implications of our failure to follow those standards that do exist.

THE PROBLEMS CONFRONTING DEVELOPMENT OF NATIONALLY COMPATIBLE SYSTEMS

3. Library computing in Australia has, at least until 1974, been developed on the initiative of individual institutions. As a result, only limited attempts have been made to apply any form of common standard to systems developed. This has led to difficulty in the exchange of data in machine readable form, owing to local decisions as to how much data will be held for each bibliographic item, what method of content designation will be used, what level of data resolution will be retained, and what form of record structure is applicable. Difficulties are also being experienced in exchanging processing software owing to the wide variety of programming languages and machines in use by libraries.
4. These problems are hardly surprising, with the stand-alone nature of the existing installations, and with the cost constraints under which installations were forced to work. Now, with the widespread acceptance of the concept of library data networks using telecommunications technology, there is yet another area of potential difficulty being introduced. While installations were operating in stand-alone mode, the problems, while a nuisance, did not seriously degrade the efficiency of the operation. With the advent of physically-connected computing systems supporting a resource sharing network, system incompatibilities take on a new significance.
5. These problems are not insurmountable, provided the Australian library community is prepared to discuss the problems and then set standards to be observed by the individual data processing sites.

STANDARDS : BENEFITS ACCRUING FROM USE AND AREAS IN WHICH THEY SHOULD BE APPLIED

6. Standards may be defined as mutually acceptable and agreed methods of describing or implementing a specific object or procedure of common interest.
These standards may be internationally agreed, nationally agreed, or they may be default standards adopted through usage.

7. Standards in themselves are of no benefit. They only acquire value when they are correctly applied. The application of standards to the internal operations at a user site will permit greater flexibility in the allocation of staff and minimise the risk of becoming overly dependent on one or two key people. Standards also permit simpler growth paths for system expansion by contributing to the commonality of the external interface for all systems employing standardised procedures.

8. Standards, when correctly applied, can substantially reduce the difficulty and cost involved in the implementation of, in the case of this discussion, library systems. They can facilitate the interchange of data and the computer programs required to process that data.

9. Standards should address all areas which affect the ability of libraries to exchange data and programs. However, some areas require more urgent attention than others if the concept of resource sharing networks is to become a reality in terms of physical networks.

10. The areas seen as requiring prime attention are the external interface points between systems. These encompass such aspects as data structures, bibliographic content, magnetic tape characteristics, telecommunications protocols, query languages and character sets.

11. There are also internal areas in which standardisation would be of great benefit. However there are a number of factors, mostly outside the control of the library data processing centres, which militate against standards in some cases. A specific case in point may be the choice of programming language. The ideal language, as decided by agreement among library DP practitioners, may not be available on a specific machine in use at a particular site, or alternatively its implementation may be so inefficient as to prove unworkable. Therefore some decisions will need to be made within the bounds of constraints which exist at the time of the decision. The main point is that the decision maker must be aware of all the ramifications of his decision.

EXISTING STANDARDS

12. There are a wide variety of ISO, ANSI, SAA and other standards already in existence. These are supplemented by what might be called default industry standards and are further augmented by bibliographic practices endorsed by various library based bodies and associations.

13. The largest single problem facing Australian libraries is not whether standards exist but which standards and practices should be adopted for use by Australian libraries. Until such agreement is reached, difficulties will continue to be experienced in implementing efficient methods of exchanging data and related systems procedures, such as programs and documentation.

14. It does not seem profitable to discuss in detail in this paper the multitude of existing standards and practices, as the views expressed would represent the views of one institution only. The prime purpose of this paper is to form a basis for discussions leading to the adoption of mutually acceptable standards by Australian libraries. A guideline to the range of standards is provided in the attached Appendix.

THE COST OF IGNORING STANDARDS

15. Obviously standards can be observed or ignored at the discretion of individual institutions. The cost of non-observance can vary, from mild nuisance to the other extreme of complete system isolation from similar processing systems at other sites. The dollar cost can be measured by the amount of duplicative work required to enable effective communication between the system and all other systems which have applied the standards.

16. The degree to which standards have been observed is also pertinent to the discussion. Some managers may be prepared to follow standards at the system interface but, for a number of reasons, such as efficiency in their particular installation, may prefer to use non-standard techniques internally. An example would be the use of a non-standard programming language, or the use of non-standard system specification documentation. This approach is perfectly valid, providing that the manager recognises the implications of the decision and its possible future effect on the operation. More importantly, there is an effect on the whole of the library data processing area in that the result of efforts expended in the non-standard installation are then difficult to apply at other library processing sites.

HOW DO WE DECIDE WHAT STANDARDS ARE APPLICABLE IN AUSTRALIA?

17. Standards, as defined in paragraph 6, are mutually acceptable and agreed methods of describing or implementing a specific object or procedure of common interest. The main points of this definition are:

- common interest;
- mutual acceptability

This implies that, before a standard is arrived at, there must have been discussion of the areas of interest by a sufficiently large group of interested parties and acceptance of the recommendations by a majority of that group. In the course of such discussions, the participants should be aware of standards, where they exist, and should be prepared to accept those standards where they cannot be demonstrated to be inappropriate. Where it is felt that the existing standards are inappropriate, then agreement should be reached as to how they should be modified. Approaches should then be made to the standards association responsible for the standard, and the matter should be discussed with them, with a view to making the standard more acceptable. Every effort should be made to accept existing standards.

18. Where no standard exists or where, after consultation with the appropriate standards organisation, the standard is still not acceptable then agreement must be reached as to what is an acceptable manner of implementing the particular function. This would form an industry standard for the Australian library community.

WHAT AREAS SHOULD BE ADDRESSED AS A FIRST PRIORITY?

19. The main areas the National Library sees as requiring attention, in order of urgency, are:

- a definitive statement on standards for bibliographic content and content designators;
- a definitive statement on record structures for data interchange on magnetic tape;
- a definitive statement on magnetic tape characteristics for tapes used for data interchange;
- a definitive statement on character sets used for data interchange;
- investigations into the area of telecommunications protocols and message formats for exchange of data between machine and machine and between machine and terminal via telecommunications facilities;
- a definitive statement on documentation standards for the exchange of system, programming and operational documentation;
- investigations into the area of a common programming language for applications programming for library data processing;
- investigation into the specification of query languages for use in the library environment.

20. Some of these tasks may involve merely ratifying existing standards or practices. Others, such as the telecommunications investigations, will require much work and should involve consultation with outside bodies such as Telecom Australia, Australian Computer Society, hardware manufacturers and Government Departments and instrumentalities. Obviously this will entail a great deal of work and cannot be done overnight.

21. While all the tasks listed above are somewhat time-critical, one is more so than others. This is the area of telecommunications protocols. The problem is not inordinately difficult, even at the present time but, unless agreement can be reached fairly soon, resources may be wasted in revising systems which are currently under development. This should be avoided if possible.

WHAT MECHANISMS EXIST OR CAN BE CREATED TO ADDRESS THE PROBLEM?

22. There are a number of bodies or groups, both formal and informal, which have an interest in the area of standards. These range from the Standards Association of Australia to informal groups working in individual institutions. What is required is the mechanism to permit a body, speaking on behalf of the Australian library community, to approach the appropriate standards body with the library community's views on specific issues, where required, or to accept and ratify existing standards for library use.

23. A suggested group would consist of members representing, say, AACOBS, universities, colleges of advanced education, technical and further education, public libraries, special libraries, CSIRO and the National Library. The size of the group would need to be limited. It is suggested that ten to twelve people would be the optimum number.

24. In the case of specific issues the library standards group could seek advice and consultation with outside organisations such as Telecom Australia.

25. The standards group would prepare discussion documents relating to specific issues for consideration and comment within the library community. After appropriate discussions and after agreement had been reached, the group could approach the Standards Association of Australia with a view to having a standard issued. In the interim period it could issue recommended guidelines to be followed by Australian libraries pending the issue of an official standard.

SUMMARY

26. The library data processing community has problems of compatibility. These problems are serious but not insurmountable. What is required is the development of guidelines for library DP development to overcome this problem in the future. This can be done by the formation within the library community of a standards review committee whose task it would be to examine existing standards, create guidelines where standards do not exist, and make recommendations as to which standards and guidelines should be followed by Australian libraries.

APPENDIX : A SELECTION OF RELEVANT EXISTING STANDARDS

Compiled by the National Library from standards issued by the International Standards Organization, the Standards Association of Australia, the British Standards Institution and the American National Standards Institute

PUNCH CARDS

Australian Standard - No. 1244 - 1972
Unpunched Paper Cards for Information Interchange

Australian Standard No. 1063 - 1971
Representation of the 7-bit coded character set on 12-row punched cards.

Australian Standard No. 1245 - 1972
Dimensions and Location of Rectangular Punched Holes in 80 columns punched paper cards

British Standard No. 4636 : Part 1 - 1970
Specification for Punched Cards, Part 1 - Unpunched paper cards

British Standard No. 4636 : Part 2 - 1970
Specification for Punched Cards - Part 2, Dimensions and Location of rectangular holes in 12 - row, 80 - columns punched cards

British Standard No. 4636 : Part 3 : 1971
Specification for Punched Cards - Part 3, Representation of 7-bit codes and of certain numerical sets on 12-row punched cards

British Standards No. 4646 : Part 4 - 1971
Specification for Punched Cards - Part 4, Representation of 8-bit codes on 12-row punched cards

International Standard No. 1682
Information processing - 80 columns punched paper cards - Dimensions and location of rectangular punched holes

International Standard No. 2021
Information processing - Representation of 8-bit patterns on 12-row punched cards

International Standard No. 1679
Information processing - Representation of 7-bit coded character set on 12-row punched cards

American National Standard No. X3.21 - 1967
Rectangular holes in twelve-row punched cards

American National Standard No. X3.11 - 1969
Specification for general purpose cards for information processing

KEYBOARDS

British Standard No. 4822 : Part 1 - 1972
Specification for Keyboard Arrangements for Data Processing Part 1. The graphic characters of the United Kingdom 7-bit data code

DATA BASE MANAGEMENT SYSTEMS

Codasyl Systems Committee Technical Report

Feature Analysis of Generalised Data Base Management Systems

Codasyl Data Base Task Group

April 71 Report

CHARACTER SETS

Australian Standards Nos 1060 to 1063 - 1971

Implementation of the Australian Standard 7-bit coded character set

Australian Standard No. 1070 - 1971

Definition of 4-bit Character sets derived from the Australian Standard 7-bit coded character set

Australian Standards No. 1060 - 1971

Implementation of the 7-bit coded character set on 7-track 12.7 mm (½ inch) magnetic tape

Australian Standards No. 1061 - 1971

Implementation of the 7-bit coded character set on 9-track 12.7 mm (½ inch) magnetic tape

British Standard No. 4731 : Part - 1971

Specification for Derivatives of the United Kingdom 7-bit Data Code Part 1. Rules for the derivation of 4-bit coded character sets

British Standard No. 4730 : 1971

Specification for the United Kingdom 7-bit data code (ISO-7-UK)

British Standard No. 4730 - 1971 (Supplement No. 1 (1972)

The United Kingdom 7-bit data code (ISO-7-UK) - Supplement No. 1. Graphical representation of the control characters

British Standard No. 4748 - 1971

Specification for Bibliographic Information Interchange Format for Magnetic tape

British Standard No. 4730 - 1974

Specification for The United Kingdom 7-bit data code (ISO-7-UK)

British Standard No. 4953 : 1973

Specification for Code Extension Techniques for use with the United Kingdom 7-bit data code

International Standard No. 2709 :

Documentation - Format for bibliographic information interchange on magnetic tape

International Standard No. 2022

Code extension techniques for use with the ISO 7-bit coded character set

International Standard No. 2047

Information processing - Graphical representations for the control characters of the 7-bit coded character set

International Standard No. 2375

Data processing - Procedure for registration of escape sequences

International Standard No. 3275

Information processing - Implementation of the 7-bit coded character set and its 7-bit and 8-bit extensions on 3.81 mm magnetic tape cassette for data interchange

International Standard No. R233 - 1961

ISO Recommendation - International System for the Transliteration of Arabic Characters

International Standard No. R259 - 1962

Transliteration of Hebrew

International Standard No. R843 - 1968

International System for the Transliteration of Greek characters into Latin Characters

International Standard No. 646

7-bit coded character set for information processing interchange

International Standard No. R961 - 1969

Implementation of the 6 and 7-bit coded character sets on 7 track 12.7 mm ($\frac{1}{2}$ inch) Magnetic tape

International Standard No. 962

Information processing - Implementation of the 7-bit coded character set and its 7-bit and 8-bit extensions on 9-track 12.7 mm (0.5 in) magnetic tape

International Standard No. 963

Information processing - Guide for the definition of 4-bit character sets derived from the 7-bit coded character set for information processing interchange

American Standard No. X3.51 - 1975

Representations of Universal Time, Local Time Differentials, and United States Time Zone References for Information Interchange

American Standard No. X3.4 - 1968

Information Interchange, Code for (ISO 646)

American Standards - No. X3.12 - 1975

Representation of Numeric Values in Character Strings for Information Interchange

American National Standard No. X3.32 - 1973

Graphic representation of the control characters of American national standard code for information interchange

American National Standard No. X3.42 - 1974

Code extension techniques for use with the 7-bit coded character set of American National Standard Code for information interchange

STATIONERY

Australian Standard P6 - 1969

Continuous Stationery for computers and other business machines

PROGRAMMING LANGUAGES

Australian Standard No. 1209 - 1972

Programming Language - COBOL

Australian Standard No. 1486 - 1973
Programming Language - FORTRAN

International Standard No. R1538 - 1972
Programming Language - ALGOL

International Standard No. R1539 - 1972
Programming Language - FORTRAN

International Standard No. 1989 - 1972
Programming Language - COBOL

American Standard No. X3.9 - 1966
FORTRAN

American National Standard No. X3.37 - 1974
Programming Language - APT

American National Standard No. X3.10 - 1966
Basic Fortran

American National Standard - No. X3.23 - 1968
COBOL

OCR AND MICR

Australian Standard No. 1436 - Part 1 - 1973
Alphanumeric Character Set OCR-B for Optical Recognition Part 1 - The Repertoire

Australian Standard No. 1436 - Part 2 - 1973
Alphanumeric Character Set OCR-B For Optical Recognition - Part 2 - Printed Image Dimensions and Form

British Standard No. 4810 Part 1 : 1972
Specification for Magnetic Ink Character Recognition Part 1, Character set E 13 B

British Standard No. 4810 : Part 2 : 1972
Specification for Magnetic Ink Character Recognition Part 2, Character set CMC 7

British Standard No. 4869 - Part 2 : 1972
Specification for Optical character recognition

International Standard No. R1831 - 1971
Printing Specifications for Optical Character Recognition

International Standard No. 2033
Coding of Character sets for MICR and OCR

International Standard No. R1044 - 1969
Print specifications for magnetic ink character recognition

International Standard No. ISO/R 1073 - 1969
Alphanumeric character sets for optical recognition

American Standards - No. X3.2 - 1970
Print Specifications for Magnetic Ink Character Recognition

American National Standard No. X3.17 - 1974
Character set and print quality for optical character recognition (OCR-A)

American National Standard No. X3.45 - 1974
Character set for handprinting

American National Standard No. X3.49 - 1975
Character set for optical character recognition (OCR-B)

MAGNETIC DISKS

British Standard No. 4850 : Part 1 : August 1972
Specification for Magnetic six-disk packs for data processing
Part 1, Mechanical and magnetic properties

British Standard No. 4850 : Part 2 : August 1972
Specification for Magnetic six-disk packs for data processing

International Standard No. 2864
Interchangeable magnetic six-disk pack - Physical and magnetic characteristics

International Standard No. 3561
Information processing - Interchangeable magnetic six-disk pack - Track format

International Standard No. 3564
Information processing - interchangeable magnetic eleven-disk pack - Physical and magnetic characteristics

American National Standard No. X3.46 - 1974
Unrecorded magnetic six-disk pack (general, physical, and magnetic characteristics)

PAPER TAPE

Australian Standard - No. 1062 - 1971
Representation of the 7-bit coded character set on punched paper tape

Australian Standard No. 1069 - 1971
Dimmensions for Punched Paper Tape for Data Interchange

Australian Standard No. 1305, Part 1 - 1974
Punched Paper Tape for Data Interchange - Part 1 - General Requirements

International Standard No. 1113
Information processing - Representation of 6- and 7-bit coded character sets on punched tape

International Standard No. 1729
Information processing - Unpunched paper tape - Specification

International Standard No. 2195
Data interchange on rolled-up punched paper tape - General requirements

International Standard No. 3692
Information processing - Reels and Cores for 25.4 mm (1 inch) perforated paper tape for information interchange - Dimensions

International Standard No. 1154
Information processing - Punched paper tape - Dimensions and location of feed holes and code holes

American National Standard No. X3.18 - 1974
One-inch perforated paper tape for information interchange

American National Standard No. 3.19 - 1974
Eleven-sixteenths-inch perforated paper tape for information interchange

American Standard No. X3.20 - 1967
Take-up Reels for One-Inch Perforated Tape for Information Interchange

American Standard No. X3.6 - 1965
Perforated Tape Code for Information Interchange

MAGNETIC TAPES

Australian Standards Nos. 1007 to 1009 - 1972
Magnetic Tape for Information Interchange

Australian Standard No. 1011 - 1972
Unrecorded Magnetic Tape for Information Interchange - 8 and 32 RPmm NRZI and 63 RPmm Phase encoded

Australian Standard No. 1068 - 1971
Magnetic Tape Labelling and File structure for information interchange

Australian Standard 1073 - 1973
Dimensions of Hubs and Reels for Magnetic Tape for Instrumentation Interchange

International Standard No. 1155 - 1973
Information processing - Use of longitudinal parity to detect errors in information messages

British Standard No. 3732 - 1972
Specification for Spools for Magnetic Tape for Instrumentation Applications

British Standard No. 3968 - 1966
Specification for 7 Track Magnetic Tape for Data Interchange Recorded at 200 r.p.i.

British Standard No. 4732 - 1971
Specification for Magnetic Tape Labelling and File Structure for Data Interchange

British Standard No. 4503 : Part 2 - 1972
Specification for 9 Track Magnetic Tape for Data Interchange
Part 2, Tape recorded at 1600 rows per inch, phase encoded

British Standard No. 4783 - 1972
Recommendations for Care and Transportation of Magnetic Tape

British Standard No. 5079 : Part 1 : 1974
Specification for 3.81 mm magnetic tape in a cassette for data interchange

International Standard No. R1001 - 1969
Magnetic Tape Labelling and File Structure for Information Interchange

International Standard No. R1858 - 1971
General Purpose Hubs and Reels, with 76 mm (3 inch) Centrehole, for Magnetic Tape used in Interchange instrumentation applications

International Standard No. 1859

Information processing - Unrecorded magnetic tapes for interchange instrumentation applications - General dimensional requirements

International Standard No. R1859 - 1971

Unrecorded Magnetic tapes for interchange instrumentation applications General Dimensional Requirements

International Standard No. 1860

Information processing - Precision reels for magnetic tape for interchange instrumentation applications

International Standard No. R1861 - 1971

7-Track 8 RPmm (200 RPI) Magnetic Tape for Information Interchange

International Standard No. 1862

Information processing - 9-track, 12.7 mm (0.5 in) wide magnetic tape for information interchange recorded at 8 rpm (200 rpi)

International Standard No. 1863

Information processing - 9-track, 12.7 mm (0.5 in) wide magnetic tape for information interchange recorded at 32 rpm (800 rpi)

International Standard No. 1864

Information processing - Unrecorded 12.7 mm (0.5 in) wide magnetic tape for information interchange - 8 and 32 rpm (200 and 800 rpi), NRZI and 63 rpmm (1 600 rpi), phase-encoded

International Standard No. 3407

Information processing - 3.81 mm (0.150 in) magnetic tape cassette for information interchange, 32 bpmm (800 bpi), phase encoded

International Standard No. 3413

Information processing - Recorded magnetic tapes for interchange instrumentation applications - Standard tape sppeds and track configurations

American National Standard No. X3.27 - 1969

Magnetic tape labels for information interchange

American National Standard No. X3.22 - 1973

Recorded magnetic tape for information interchange (800 CPI, NRZI)

American National Standard No. X3.14 - 1973

Recorded magnetic tape for information interchange (200 CPI, NRZI)

American National Standard No. X3.39 - 1973

Recorded magnetic tape for information interchange (1600 CPI, PE)

DATA TRANSMISSION

Australian Standard No. 1484 Parts 1 to 4 - 1973

Digital Data Transmission

British Standard No. 4421 - 1969

Specification for a Digital Input-Output Interface for Data Collection Systems

British Standard No. 4505 : Part 1 - 1969

Specification for Digital Data Transmission Part 1, Basic mode control procedures

British Standard No. 4505 Part 2 - 1969

Specification for Digital Data Transmission Part 2, Character Structure for start/stop and synchronous transmission

British Standard No. 4505 - Part 3 - 1969

Specification for Digital Data Transmission Part 3, The use of longitudinal parity to detect errors in information messages

British Standard No. 4505 - Part 4, 1971

Specification for Digital Data Transmission Part 4, Code independent information transfer

British Standard No. 4505 : Part 5 : 1971

Specification for Digital Data Transmission Part 5, Assignment of connector pin numbers for interchange circuits between data terminal equipment and data communication equipment

International Standard No. 1177 - 1973

Information processing - Character structure for start/stop and synchronous transmission

International Standard No. 1745

Information processing - Basic mode control procedures for data communication systems

International Standard No. R1745 - 1971

Basic Mode control procedures for data communication systems

International Standards No. 211 - 1972

Data Communication - Basic mode control procedures - Code-independent information transfer

International Standard No. 2110

Data communication - Data terminal and data communication equipment - Interchange circuits - Assignment of connector pin numbers

International Standard No. 2111

Data communication - Basic mode control procedures - Code independent information transfer

International Standard No. 2593

Connector pin allocations for use with high-speed data terminal equipment

International Standard No. 2628

Basic mode control procedures - Complements

International Standard No. 2629

Basic mode control procedures - Conversational information message transfer

American Standards - No. X3.1 - 1969

Synchronous Signaling Rates for Data Transmission

American Standards - No. X3.15 - 1966

Bit sequencing of the American National Standard Code for Information Interchange in Serial-by-Bit Data Transmission

American Standard No. X3.16 - 1966

Character Structure and Character Parity Sense for Serial-by-Bit Data Communication in the American National Standard Code for Information Interchange

American National Standard No. X3.44 - 1974

Determination of the performance of data communication systems

American National Standard No. X3.28 - 1971

Procedures for the Use of the communication control characters of American National Standard code for information interchange in specified data communication links

American National Standard No. X3.29 - 1971

Specifications for properties of unpunched oiled paper perforator tape

American National Standard No. X3.25 - 1968

Character structure and character parity sense for parellel-by-bit data communication in the American National Standard code for information interchange

American National Standard No. X3.16 - 1966

Character Structure and Character parity sense for serial-by-bit data communication in the American National Standard code for information interchange

American National Standard No. X3.24 - 1968

Signal Quality of Interface between Data Processing Terminal Equipment and Synchronous Data Communication Equipment for Serial Data Transmission

American National Standard No. X3.26 - 1970

Hollerith punched card code

GENERAL

Australian Standard No. X2 - 1969

Flowchart Symbols for Information Processing

Australian Standard No. 1189 - 1972

Vocabulary for Information Processing

British Standard No. 3527 - 1962

Glossary of Terms used in Automatic Data Processing

British Standard No. 4058 Part 1 - 1966

Specification for Data Processing Problem Definition and Analysis Part 1, Flow chart symbols

British Standard No. 3527 Part 1: 1976 (ISO 2382/1 - 1974)

Glossary of terms used in Data processing (ISO Title: Data processing vocabulary)

British Standard No. 3527 : Part 4: 1976 (ISO 2382/IV - 1974)

Glossary of terms used in Data processing (ISO Title: Data processing vocabulary)

British Standard No. 3527 Part 5 - 1976 (ISO 2382/V - 1974)

Glossary of terms used in Data processing (ISO Title: Data processing vocabulary)

British Standard No. 3527 : Part 6, 1976 (ISO 2382/VI - 1974)

Glossary of terms used in Data processing (ISO Title : Data processing vocabulary)

British Standard No. 4058 - 1973

Specification for Data processing flow chart symbols, rules and conventions

International Standard No. 2382/1

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American Standards - No. X3.5 - 1970

Flowchart Symbols and their Usage in Information Processing (ISO 1028)

American Standard No. X3.12 - 1970

Vocabulary for information processing

American National Standard No. X3.30 - 1971

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